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AMERICAN INSTITUTE OF CONSULTING ENGINEERS

Proceedings of the Annual Meeting
Held January 13, 1936

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AMERICAN INSTITUTE
OF
CONSULTING ENGINEERS

Proceedings of the Annual Meeting
held at the University Club,
New York City, January 13, 1936

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ANNUAL MEETING

of the

American Institute of Consulting Engineers

The Annual Meeting of the American Institute of Consulting Engineers, preceded by a dinner at 7.00 o'clock, convened at 9.00 p. m., Monday, January 13, 1936, at the University Club, 1 West 54th Street, New York City, Mr. George W. Burpee, President of the Institute, presiding.

The following members were present:

Howard C. Baird
F. A. Barbour
George E. Beggs
Clinton L. Bogert
Baxter L. Brown
George H. Burgess
George W. Burpee
J. F. Coleman
W. W. Colpitts
Hugh L. Cooper
W. H. Coverdale
F. G. Cunningham
George C. Diehl
Charles C. Egbert
Merton L. Emerson
James Forgie
E. P. Goodrich
J. E. Greiner
Alonzo J. Hammond
Shortridge Hardesty
L. L. Hidinger
W. W. Horner
Fred Lavis
Daniel W. Mead
George A. Orrok
C. P. Perin
Albert T. Perkins
Henry G. Perring
Malcolm Pirnie
W. B. Poland
Robert Ridgway
Ralph R. Rumery
James F. Sanborn
Maurice R. Scharff
Ole Singstad
Carl H. Stengel
Edwin F. Wendt
Robert Spurr Weston
T. J. Wilkerson

There were also present the following guests:

Archibald Bowman
Carl Brandt
Karl T. Compton
C. E. Davies
F. M. Feiker
J. L. T. Ferebee
Frederick H. Fowler
W. O. Hotchkiss
Fred Lavis, Jr.
George L. Lucas
Ralph A. McClelland
E. B. Meyer
E. R. Needles
E. N. Noyes
A. B. Parsons
A. A. Potter
John C. Reidel
William Roberts
J. H. Sanford
F. E. Schmitt
H. H. Sears
George T. Seabury
H. J. Sherman
Homer B. Vanderblue
C. O. Wellington
Thomas A. Wright

President Burpee: We have with us to-night, as guests of the Institute, President Compton, of the Massachusetts Institute of Technology; President William O. Hotchkiss, of Rensselaer Polytechnic Institute; Dean A. A. Potter, of the Engineering School of Purdue University, who has just been elected President of American Engineering Council; Mr. Feiker, Executive Secretary of American Engineering Council; Dr. Daniel W. Mead, who will be, on Wednesday, President of the American Society of Civil Engineers (applause); Mr. E. B. Meyer, President of the American Institute of Electrical Engineers; Mr. C. E. Davies, Secretary of the American Society of Mechanical Engineers; Mr. A. B. Parsons, Secretary of the American Institute of Mining and Metallurgical Engineers; Mr. John C. Reidel, President of the New York State Society of Professional Engineers; Mr. C. O. Wellington, President of the Association of Consulting Management Engineers; Mr. F. E. Schmitt, Editor of *Engineering News-Record;* Mr. T. A. Wright, President of the Association of Consulting Chemists and Chemical Engineers; and Mr. George T. Seabury, who sneaked in at the last minute, because he got away from the Board meeting of the American Society of Civil Engineers. We have also with us to-night as one of our own members, Mr. John F. Coleman, retiring President of American Engineering Council. (Applause.)

I am reading only those who are present as guests of the Institute. The welcome is no less effusive to the guests we have with us who are no less distinguished, but who are here accompanying our members. (Laughter.) I must have make a joke unconsciously.

This is the Twenty-third Annual Meeting of this Institute. We have behind us twenty-two years of active service, we hope, to the profession.

The first matter of business is the report of the Tellers, Mr. Diehl and Mr. Bogert. Mr. Diehl, will you report, please?

Mr. Diehl: I think Mr. Bogert ought to make this report. They say Mr. Bogert had too many cocktails. I am a little hoarse, but I am able to talk.

There were sixty-seven ballots cast, and all the votes were for the same three candidates. It is a pleasure for me to read the names of the three men, Messrs. Emerson, Hardesty and Ridgway. (Applause.)

Voice: No scattering votes this time?

Mr. Diehl: We didn't see anything scattered.

President Burpee: These new members of the Council are, therefore, declared duly elected, Messrs. Ridgway, Hardesty and Emerson.

Mr. Ridgway has already made his reputation as Chief Engineer of the Transit Commission of New York State, and as President of the American Society of Civil Engineers. Mr. Hardesty has made his reputation as a structural engineer, a partner of our beloved member, J. A. L. Waddell. Mr. Emerson has made his record as an industrial and mechanical engineer.

Will the newly-elected members of the Council please stand so that we can take a good look at them and give them a hand? (Applause.)

These three members of the Council take the place of Vice-President Lavis, whose term expires to-morrow; of Mr. Stengel;

and of your humble servant, whose term expires to-morrow, but who, by virtue of our Constitution, will be always with you.

We will consider, for the purpose of speeding the proceedings to-night, inasmuch as the minutes of last year's meeting have been formally sent to the membership, that these minutes have been read and approved, and therefore the reading of them will be dispensed with for this evening.

The Treasurer's report and the Secretary's report will be presented at the Council meeting to-morrow. To all members of the Council, the Council meeting is at one o'clock to-morrow at the Engineers' Club. All new members and Past Presidents are requested to be present. The election of officers doesn't take place until to-morrow.

The next piece of business on this program is a report from the Development Committee. Mr. Lavis and Mr. Diehl, in particular, have done more than their usual share of work the last few months, and Mr. Lavis has presented formally a report of several pages, which he is going to abstract for us to-night, so that you can see as a matter of interest what work the Council has been occupied with, particularly during the last half of the year. Mr. Lavis! (Applause.)

MR. LAVIS: Was that Goodrich who was talking there? Then, I won't bother to reply.

This, gentlemen, is a very serious matter. I wish I could tell a story like my friend, Col. Cooper, or our former President, Dr. Perin. However, Mr. Diehl and myself were charged with what we took to be a rather serious matter, and the President has asked me to tell you more or less about what has happened in the past year in the so-called Development Committee.

At the organization meeting of the Council a year ago, there was a general discussion of possible ways and means of increasing the usefulness of the Institute and, possibly also, of increasing its membership.

Shortly thereafter, letters were sent to our members, considerable correspondence ensued, and finally, in October last, a general letter was sent out over the signature of our President to some 1,800 engineers in private practice and consulting engineers throughout the United States.

To these letters a large number of replies have been received, distributed as to origin, throughout almost all the States of the Union, with many from engineers of national prominence. The Institute is represented by its membership in some 18 States and 28 cities; these replies came from twice as many States and nearly four times as many cities.

The following two questions were asked in our letter:

> 1. Can you suggest ways and means whereby those in public office in your vicinity or State may be brought to a realization of the need and benefit of skilled engineering advice;
>
> 2. Can you suggest means by which the general public may be brought to a similar realization that engineering advice is indispensable to sound economic planning, permitting the conservation of both public funds and private capital.

The substance of the replies may be summarized very briefly as follows:

> 1. That the problem is one of present live importance and that engineers in private practice are generally unanimous in the opinion that some agency or force should oppose the present tendency toward governmental monopoly and the so-called "socialization" of engineers. That is, the tendency toward socialism and the suppression of independent thought and opinion.
>
> 2. That there are, throughout the country, many local societies and groups of engineers, some consisting exclusively of those in private practice, which are ready to co-operate in any effective and proper efforts to secure a better use of existing engineering talent. Many of these local societies comprise in their memberships Electrical, Mechanical, Mining, Chemical, as well as Civil Engineers.

3. There is a very general feeling that a co-ordinating agency is essential.

4. That continuous effort in the creation and maintenance of interest, and publicity for the profession and its achievements, is necessary.

I wish here to acknowledge the very valuable work which has been done by my colleague, Mr. George C. Diehl, in developing our problem. His collaboration has been of really inestimable value.

Your Committee has prepared for the Council a somewhat voluminous report which contains abstracts and quotations, with running comment by the Committee, from the numerous letters received. There is some criticism, some praise, but on the whole they are remarkably in accord, coming as they do from men used to careful thinking and independent expression.

The comments have been grouped under the following headings, which indicate the scope of the report:

- Governmental Projects—Public Works.
    - Socialization.
    - Present and Future Governmental Activities.
    - Construction League of America.
    - Political Patronage in Appointment of Engineers.
- Education.
- Definition of Consulting Engineer.
- Competence of Engineers.
- Compensation of Consulting Engineers by Government.
- Need of Advertising the Value of Engineering Service.
- Scope of Government Employment of Consulting Engineers.
- Report of Economics and Finance Division of A. S. C. E.
- Industrial Competition in Engineering Advice.
- The National Engineering Societies.
- American Engineering Council—U. S. Chamber of Commerce.
- Representation of Engineers in Private Practice and Consulting Engineers.
- Engineering Opinions as a Prerequisite to Financing.
- Activities of Certain Local Engineering Organizations.
- Expansion of American Institute of Consulting Engineers.
- Methods of Bringing to the Notice of Public Officials need of Engineering Services.
- Newspaper publicity and advertising.

Inasmuch as the report and its accompanying quotations represent the considered thought of a large number of experienced members of the profession, it is the hope of your Committee that, in spite of its length, it may be found possible to make it available to our members, to our correspondents, and to the national and local engineering associations which are interested in the problems discussed and which are working toward the maintenance of the independence of engineers in private practice and the more extensive use of consultants who have really earned that title.

Two matters of importance were evident even at the beginning of our inquiry, namely:

> The trend toward so-called socialization of engineers through their direct employment in large numbers by the government,
>
> and
>
> The lack of really expert counsel in the planning and carrying out of Public Works projects by governmental agencies.

In its efforts at relief of unemployment, through the large expenditures of money for Public Works, the National Government has developed a tremendous staff of engineers recruited from private industry, from the staffs of engineers in private practice, and even many of these latter themselves.

As a measure of temporary relief, there might be little criticism of this, except for the fact that older and more experienced engineers have been largely ignored. To quote only one correspondent:

> "The Government has taken on a good many young engineers and architects. The older and more experienced men have been passed over either because they were considered too high-priced for the Government service or because in many cases they were naturally unwilling to give up their status as consultants in order to become, as one might say, 'journeymen engineers.' "

There was, of course, the "Board of Review" of the PWA appointed by Secretary Ickes, but that only functioned temporarily and its opinions as to the economic validity of certain projects were, at least to some extent, ignored.

It is also a fact, of course, that some consultants have been and still are employed by certain governmental agencies, but there is general condemnation of the low scale of fees and limited expenses allowed. Speaking generally, it is also believed to be true that consultants engaged by the government usually have been required to pass only on structural details and not on the economic aspects or value of the projects.

Referring to the so-called "socialization" of engineers, it is obvious, of course, that direct employment on a weekly or monthly wage basis of professional men by the government, even under favorable conditions, must at least militate against that independence of thought so essential to the determination of the real value of engineering projects, or their adequate consummation into accomplished facts. When, however, as at the present time, such employment is largely the result of political patronage, the result can be little short of disastrous.

Of course, we recognize that, in theory, these are only temporary measures, but the growth of acres and acres of office space in Washington, in granite-faced buildings, of the most permanent types of construction, seems to indicate the belief of the present administration in the permanence of its present extensive organization. This is one phase of the problem which needs immediate attention.

Our attention has also been called to studies and reports by the various endowed "Foundations" which in some cases overlap the field of the engineer in private practice. An example of this is the investigation of County Governments in the State of New York by the Institute of Public Administration, whose reports on the Public Works and Engineering phases of county government seem to leave a good deal to be desired from a competent engineering point of view. This is all the more to be deplored, when it is realized that for example, in Westchester County alone, during the past ten years, expenditures for Public Works have amounted to some 90,000,000 dollars or 50% of the total budget of that county.

The question of the reorganization of county government in the State of New York has been repeatedly referred to by successive governors for the past several years and now has become a matter for immediate action. It is, therefore, unfortunate that the engineering phases of this matter have not received what seems to be adequate consideration.

A bill for the purpose of this general reorganization has just been introduced in the Senate at Albany and among other things there is the most careful provision for audits of expenditures by independent outside Public Chartered Accountants. This, of course, is wise and as it should be.

It should, however, be equally evident that with the very large expenditures for Public Works which are made, even under normal conditions, *that outside, independent* engineering advice is even more necessary in order to check unwise expenditures before they are made rather than merely to audit them after the money has been spent.

Our legal friends have established, and with good reason, the conviction that their services are of real value in keeping people, corporations and industrial organizations out of trouble, rather than merely helping to save them after they get *into* trouble. The highest retainers are paid for such services.

It is our business as engineers to build up similar belief in the value and importance of engineering advice before, rather than after. To prevent trouble rather than to try and remedy it.

Many illustrations of this might be cited, but let me take only one right here at our door-step. The City of New York undertook the construction of the Triborough Bridge, a project costing some $40,000,000, without the slightest competent study of the amount and nature of the traffic which might use the bridge, with no competent estimates or thought of where such traffic might come from or where it might be going. Only after the structure was too far advanced to permit changes was such a study authorized. This, it should be made clear, is no reflection on the present administration or engineering staff now in charge of the project. Had a railroad or industrial enterprise, however, shown such complete lack of appreciation of the fundamentals of business or economics, its misdeeds would have been shouted from the housetops by the numerous governmental agencies just now supposed to be guarding the interests of the people.

Many of our correspondents think that engineers should take active and positive steps to expose the economic waste of projects unfounded on sound business principles or on prior competent study of their usefulness and purpose, and this is all the more important because of the difficulty of tearing down engineering structures once they are under way.

In the field of finance and in connection with issues of securities, engineering advice and certification might well be placed on a par with legal advice and certification. This is specifically referred to in the report and might also well be made a subject of special study, although it is a matter to which the Institute has given quite a little attention in the past.

Many large industrial corporations have long realized that engineering in its highest aspects is of the same nature as preventive legal and medical service. That high grade engineering advice is not only insurance against trouble, but that the economic knowledge and foresight of the experienced trained engineer is of inestimable value in planning for the future and as insurance not merely of controlled expenditures during construction, but also of future low costs of operation and maintenance, and of low costs of production.

Unfortunately, there are large sums of money being expended for Public Works by governmental agencies, State, County and Municipal as well as Federal, where these economic considerations are ignored. Large expenditures in the aggregate are also made by many industrial organizations which have not yet arrived at a full realization of the value of competent engineering advice.

It is to these matters that the engineering profession must address itself in an effort to make the value of its more competent services appreciated. In this also the Institute may well gird itself to take the lead.

The report of this Committee presented to the Council indicates ways and means by which this may be done, but this will involve energetic and continuous action along the lines therein indicated and others which may be developed.

It is a debatable question where the National or Founder Engineering Societies stand in this matter and whether they are the proper agencies for carrying out this particular phase of engineering development and usefulness.

In the first place, their main function has been, still is, and must continue to be, the development and dissemination of technical knowledge of engineering, and the recording of developments and advances in technique and professional attainments. In the second place, their membership is composed of all classes of engineers, men of the highest rank in both private practice and heads of corporate engineering organizations, those advancing through the stages of experience and development, the younger members and students. A large proportion of their members are employees.

There is needed an organization of nation-wide scope, embracing all types of engineers—Electrical, Mechanical, Mining, Chemical, as well as Civil, devoted to the higher interests and welfare of the profession, capable of and equipped to demonstrate its vital importance as one of the major economic factors in the progress of our country and as an important element in our business life.

Besides the great national technical societies, there are also such national organizations as the American Association of Engineers and the various Societies of Professional or Licensed Engineers and they must occupy some place in any movement of this kind. They are, however, composed very largely of the younger members of the profession and their function is quite largely that of ameliorating or improving the working conditions of their members rather than the development of appreciation of the economic as well as technical value of the services of men in the higher ranks.

There is also American Engineering Council, with its headquarters at Washington, which should be, or might be, an important instrument for the advancement of these phases of engineering welfare. It is in a position to establish contacts with the National Government and might easily extend these contacts to State Governments. So far as your Committee knows, however, it has not yet established itself in a position to wield the necessary effective influence to the ends we have herein indicated.

American Engineering Council represents, through its subscribing members, 7 National Societies, 11 State and 24 Local Societies of Engineers, quite widely distributed throughout the country. Through this support it can very well be of important use to the profession.

Heretofore, however, so far as your Committee knows, its activities have looked principally to the welfare of engineering employees.

This, of course, is important, but there is evident need of much better representation of the interests of employer engineers, engineers in private practice and consultants. It perhaps might be fair to say that if these latter were adequately recognized the problem of welfare of the employees would be in a fair way toward solution.

A copy of our full report will be made available to American

Engineering Council and it is hoped that they may be able to place themselves in a position to further the objects we have in mind.

There remains our own Institute. We have heretofore devoted ourselves very conservatively to maintaining and promoting the highest ideals of professional ethics and conduct, but it appears that this alone is not sufficient for the protection and promotion of the interests of our members. Your Committee is recommending to the incoming Council the very serious consideration of broadening the scope of our activities.

We believe this can be done without in the least lessening the high standards we have established and maintained.

The Institute is national in scope, its members must be of high attainment in the profession and of the highest ideals and it is the only national association of engineers which represents exclusively engineers in private practice.

Your Committee, therefore, believes that the Institute must place itself in a position to represent, in so far as may be possible, not only engineers of high attainment as consultants, but also engineers of established reputation in private practice and be the main vehicle for furthering and promoting their interests.

We further believe that American Engineering Council should be, or may become, an important factor in this furtherance of the interests of these engineers and that every effort should be made to co-operate with, and secure the co-operation of, the many local associations which are already actively interested in and attempting a solution of this problem.

We recommend to your careful consideration a study of our full report to the Council.

President Burpee: Thank you, Mr. Lavis. Is there a motion with respect to this report?

Mr. Goodrich: I move it be printed *in extenso*.

President Burpee: The report which he has just read, or the full report?

Mr. Goodrich: The full report.

President Burpee: Is there a second? (The motion was seconded by Dr. Perin.)

President Burpee: It has been moved and seconded that the report of the Development Committee be published in full and distributed to the membership. Any discussion? All in favor please say "aye"; contrary-minded, "no." It is carried and so ordered, with the thanks of the Institute to Mr. Lavis and Mr. Diehl for a very great sacrifice of time on their part in the compilation of their report.

The next item on the program is the report of the President, which, gentlemen, I shall try to make as brief as I can. Our Past President reminds me that I want one of the reserved seats in Heaven, which goes for brevity.

The Institute was incorporated on November 21, 1913. It has now completed twenty-two years of active service to engineers in private practice. We have completed the past year with practically no net change in our financial status and no net change in the number of our membership. We closed the year with applications pending from two prominent young engineers, on whose admittance formal action will be taken—one at the January meeting of the Council to-morrow and one at the Council meeting in February.

During the year, we have held ten regular meetings of the Council and two special meetings and, in addition, two special meetings of the Executive Committee. Eleven of the Council meetings were luncheon meetings and one, on June 5, was a dinner meeting held at this club, and a most delightful occasion.

The speakers at the luncheon meetings were, in the order of their appearance:

Fred Lavis.
Colonel W. T. Chevalier, of the McGraw-Hill Company.
Walter W. Colpitts.
George H. Stover, Counsel of the Transit Commission of New York.
Howard C. Sheperd, Vice-President of the National City Bank of New York.
J. K. Finch, Renwick Professor of Civil Engineering at Columbia University.
Charles P. Perin, our Past President.

The guest speaker at the June dinner meeting was Dr. Mark Graves, New York State Commissioner of Taxation and Finance, who spoke on "The Consulting Engineers' Contribution to the

Improvement of Public Service and to the Reduction of Its Cost in Taxes."

We formally record our thanks to these guest speakers, both members of the Institute and non-members, who have contributed so much to our edification and enjoyment.

At least once a year it is well for us to rehearse the objectives of our Institute, to test the accomplishments of the year in the light of these objectives and, as it were, to reorient ourselves for the year which lies ahead. These objectives, as stated in Article 1 of our Constitution, are:

First: To encourage the practice of engineering as a profession;
Second: To promote ethical principles and practice;
Third: To advance the interests of engineers in all branches of the profession; and
Fourth: To increase the usefulness of the profession to the public at large.

Our efforts during the past year have been largely concerned with the last two objectives, as you will have already gathered from listening to Mr. Lavis' exceptionally fine report.

For your information, I will review briefly the work of the year:

Mr. Hadden, who did such fine work last year as a Code Committee, continued to function during the early part of 1935. Incidentally, it should be recorded that the Institute, in voting as a member of the United States Chamber of Commerce's questionnaire on NRA, voted against the continuation of the NRA. Unhappily, the majority of the members of the Chamber voted for continuation of the NRA, but on the historic day in May the United States Supreme Court intervened on our side and relieved Mr. Hadden of his labors. The thanks of the Institute are due him for the efforts which he exerted and the fine judgment which he displayed.

As to the work done by the Institute to advance the interest of engineers and to increase the usefulness of the profession to the public—we devoted a large part of our time to two projects: first, the protection of the status of engineers in private practice; and second, the Public Utility Act of 1935.

As to the former, Messrs. Diehl, Chandler Davis and Goodrich were appointed, on March 6, a Committee on Highway Transport, and from their report, which was presented to a special meeting on June 26, arose the preparation of a letter sent to 1,800 engineers in private practice throughout the United States in an effort to ascertain specific ways in which the Institute could increase its usefulness, both to the engineering profession and to the public at large. I will not attempt to review again the returns from this letter, on which Mr. Lavis has already reported. Suffice it to say, the returns from the letter indicate in a most striking way the necessity of the work done by the Institute.

At a special meeting of the Executive Committee on February 13, to consider proposed legislation in connection with the PWA, resolutions were adopted and forwarded to the Senate and House Committees on Appropriations, asking that legislation be so framed that maximum use could be made of engineering and construction firms already in existence and competent to serve on Government projects. This action on our part was largely stimulated by American Engineering Council.

On August 6, a special meeting of the Executive Committee adopted resolutions and forwarded them to the Senators from New York and the Committee considering a Senate bill which would have excluded all but lawyers from practicing before the various Governmental bodies.

After an attempt of several months to interview Governor Lehman, an opportunity was finally granted on November 30, and the Governor received Messrs. P. W. Henry, Gavin Hadden, George C. Diehl and myself at his residence and permitted us to present to him our views of the many ways in which engineers in private practice could be of benefit to the State. Subsequent to this meeting, a written memorandum was presented to reinforce the subject-matter of the conversation. The thanks of the Institute are due to Mr. George C. Diehl for the initiative which he took in the matter of the conference with the Governor, as well as for his work on the special committee.

The second project has been the attempt, in the first instance, to have the language of the Public Utility Act of 1935, in so far as it affected engineers, be such as not to be disadvantageous to our interests; and secondly, to assist the Securities and Exchange Commission to set up regulations which would be in harmony with the objectives of the Act, and not impose unfair burdens upon members of our profession.

This matter was first called to the attention of the Institute by Mr. Scharff at the meeting on March 6, at which meeting resolutions were passed and forwarded to the various members of the Congress involved, with copies to American Engineering Council, protesting against certain provisions of the Public Utility Act of 1935 and against any legislation tending to extend the jurisdiction of the Federal Power Commission over practicing engineers. Messrs. Scharff and Henry were appointed a committee to work with American Engineering Council in an attempt to secure modification of the language of the Act in such a way as to remove its prejudicial limitations on engineering.

As you know, the Act was finally passed, and its execution was entrusted to the Securities and Exchange Commission. Mr. Scharff has had several interviews with members of this Commission on the matter, and the SEC has shown a willingness to co-operate. The Institute has been the only engineering body represented at these meetings. Our thanks are due in the largest measure to Mr. Scharff for the study and action which he has taken, to Mr. Henry for his help and to Mr. Wendt for the assistance rendered in Washington.

Other public service which the Institute has been privileged to render has been: Co-operation with the Mayor of New York, by representation of Mr. F. A. Burdett on the Mayor's Committee on Noise Abatement; co-operation of a committee, consisting of Messrs. Beggs, Horner and Ridgway, with the Commission of Inquiry on Public Service Personnel; and the appointment by the Department of State of the United States Government of the American Institute of Consulting Engineers as a member of the American National Committee for the Third World Power Conference, to be held in Washington in September, 1936.

It now becomes my sad duty to report the one death which has occurred among our members—that of Harry de Berkeley Parsons, member of the Institute since 1922, member of the Council from 1924 to 1926, and President in 1926, a graduate of Columbia University in the Class of 1882, of Stevens Institute of Technology in the Class of 1884, made a Doctor of Engineering in 1926, Professor of Steam Engineering at Rensselaer Polytechnic Institute from 1882 to 1907 and since that time Professor Emeritus, also a distinguished hydraulic engineer with a long record of public service, including membership on the Nicaragua Canal Commission, on the Metropolitan Sewage Commission of New York, consulting engineer to the Board of Estimate, and other lesser duties, a man of broad human interest, a professional life exemplifying the best that the professional engineer can give to his country.

We have worked during this year, as in previous years, in close co-operation with American Engineering Council in Washington, and I wish to extend formally the thanks of the Institute to Mr. Coleman, the retiring President of American Engineering Council, and one of our own past presidents, and to Mr. Feiker, Executive Secretary of American Engineering Council, from whom we will hear later of the work of that body. I want further to express to Dean Potter, the incoming President of American Engineering Council, the desire of the Institute to continue its close co-operation with the Council.

Because Mr. Henry is not present to-night, it seems fitting to pay him a special tribute, which can be done without causing the blushes to rise to his cheeks. Presidents come and presidents go, but the Secretary goes on forever, and such service as Mr. Henry has given to this Institute as Secretary and Treasurer for many years, with no compensation, is unexampled in my experience. We value not only the work that he does, but also his wise counsel. With your approval, I suggest the sending of the following cablegram to him at Buenos Aires:

> "The Institute, from its annual meeting, sends affectionate greetings to its most useful member and regrets his absence to-night."

Now, a final and personal word. I end to-morrow my three-year term on the Council. It is only through being in constant and active touch with the work which the Council does that one comes to realize the essential nature of the work of this Institute. I wish every member, sooner or later, would have the opportunity so to serve. To one who has so much at heart the perpetuation of the fine traditions of our profession, it has been a special privilege to be able to work for this Institute, even while I have been haunted with the consciousness of efforts many times ineffectual.

To the members of the Council in particular, and then to all the members of the Institute, I render thanks for help and forbearance, and shall have for many years the pleasant memories of our close and friendly association.

That, gentlemen, completes the President's report of this Institute. (Applause.)

The business of the evening is now behind us, and we can turn to edification, pleasure and enjoyment. We might say that with the talent we have here this might be an academic evening. I suspect that the academic talent that is present, representing at least five different institutions from the point of view of teaching alone, is very much tinged with practical application; so I suspect that what we shall hear from the "halls of the academy" will not be what we ordinarily call academic, but will be intensely practical.

I was told not so long ago that Mrs. Compton had recently been awarded the degree of LL.D. for having brought up three sons, each of whom had achieved a distinguished position in life. In introducing President Compton, of M. I. T., I want to pay tribute to the mother who raised not only President Compton, but his two brothers, to the eminence that they have achieved.

President Compton, as you know, is now at the Massachusetts Institute of Technology. His subject to-night is "Flow Sheets from Education into Industrial Research." I must admit that that subject has very greatly stimulated my curiosity. We will now let President Compton tell us what he means. President Compton! (Applause.)

MR. COMPTON: Mr. President, Presidents Galore, Members of the Institute: I confess to a feeling of considerable inferiority, almost an inferiority complex, in being at such a distinguished gathering. I overheard one of your members on the way in say to one of the guests in describing this galaxy of gentlemen to-night, "These are the face cards and the aces of the profession all gathered together."

The number of presidents that were enumerated in the introductions made me think of my first introduction by a toastmaster when I assumed, or was about to assume, this title. I think it has perhaps some bearing on the present situation. A president was defined as a pillar of brass by day and a cloud of gas by night. (Laughter.) I think perhaps one might carry that Biblical illusion a little further by saying that a president is supposed to lead his tribe through the wilderness into the promised land. I submit to you that perhaps the day of the president is over, because if the

New Deal accomplishes its purposes, we are in the promised land and we need no further leadership. (Laughter.)

The words of a toastmaster in introducing a speaker, I think, are often an attempt of the toastmaster to justify himself. Some of the things your toastmaster has said I cannot possibly take exception to. It makes me think of a story about a toastmaster by the name of Abie, who was throwing a party, and who was introducing the speaker, his friend, Ike. He said, "My friends, I want you to meet my friend, Ike. Ike is a great business man. Last year he made $50,000 selling real esate." Ike made his speech. After the dinner was over, Abie said, "That was right what I said about you, wasn't it?"

Ike said, "Well, it was nearly right. It was neckties I sold, not real estate, and it wasn't $50,000, it was $3,000, and I didn't make it, I lost it." (Laughter.)

Toastmasters have to be taken with a certain grain of salt. You probably heard about the Bishop who was very much enamored of a very gracious lady. One time he found himself sitting beside her at a dinner party. He was somewhat ill at ease and a little nervous, and he upset the salt-shaker. That was a bit of hard luck. He took a bit of salt and threw it over his left shoulder. She had on a very low-back evening dress. She was talking to the neighbor on the other side, and salt trickled down and down and down. She turned around and said, "You can't catch me that way, Bishop." (Laughter.)

I have been very much impressed with the way the members of this Institute seem to enjoy each other's company. It has been a very happy occasion. I think everybody has been very much at ease, except two of us at this corner, Fred Feiker and myself. We have been matching pennies to see which one would be called on first. I lost, I am sorry to say.

There was a farmer who was going along a road one time hauling a load of manure, and he passed a nigger walking along the road. The nigger asked for a ride. He said, "All right, jump on behind." After a while, they came to a toll-gate. The keeper said, "What have you got on?"

He said, "I have a load of manure and a nigger." He paid his fee and went on.

He came to the next toll-gate, and again the keeper stopped him and asked what he had on. He answered, "A load of manure and a nigger."

As he approached the third toll-gate, the nigger spoke up from behind and said, "Boss, when we gets there, would you mind calling my name first?" (Laughter.)

Your toastmaster said he was very much intrigued to find out what I had to say on this subject, "Flow Sheets from Education to Industrial Research." I will confess I am somewhat interested myself, or I was up until quite recently, because, having a vague inspiration, and being asked for a title in advance, which is always a dangerous thing to do, I thought that subject allowed of a considerable amount of latitude. When I came to investigate it, the latitude was somewhat more than necessary. What I had in mind was a certain analogy between an educational institution and a manufacturing organization. They have some corresponding processes in this way: A manufacturing organization has to have its raw material, and it takes that raw material and processes it in some sort of way and makes a more or less finished product out of it, and then it has to sell that product.

In the educational institutions we have, of course, exactly the same problem: we have to get our raw material, we have to do a certain type of processing on that raw material, and then we have to sell the raw material after we get through with it.

There are several tendencies that are being felt all through educational institutions at the present time in regard to all three of these processes: the selection of the raw material, as the students; the processing, their educational program in the institution; and the sales, or the placement of these men after they get through.

I will mention only very briefly what some of these are. It has become quite well recognized as engineering has come to be more and more of a learned profession, a profession requiring a high degree of training and skill, and that not all raw material is suitable for manufacturing into the finished product. Consequently, a good many attempts are being made in an endeavor to get into our educational institutions the right type of raw material. Psychological tests are being employed, I think, quite frankly, not with the thought that psychological tests are yet developed to the stage with which it is possible to pick out good raw material, but rather in the hope that through these tests and a study of correlation between various tests and future performance, some sort of criterion can be set up.

Then, there are aptitude tests, to try to find out whether, for instance, a boy has a mechanical turn of mind, as a means of steering him into or away from any branch of engineering, or other fields. The matter of the personal interview is coming to be more and more stressed in admission into educational institutions, because of the realization that an engineer, to be effective in his profession, has to be something more than an intellectual machine; he has to be at the same time a human being, and he has to deal with human beings; he has to have certain qualities that are not measured simply by grades attained from secondary schools.

A good many institutions are putting in limitations—not only engineering schools. In fact, the engineering schools have lagged behind some of the others in this respect. Harvard, Yale and Princeton each limit their incoming freshman classes. We, at M. I. T., have within the last few weeks adopted a principle of stabilization in our institution designed to try to keep our numbers within the number which we can handle most effectively with our facilities.

Then, there are attempts made to assist boys in guiding themselves. Notable among these, for example, is the Summer Camp that is run by the Stevens Institute of Technology over in New Jersey, where boys who think they may want to go into engineering as a profession are invited, to find out what engineers really do when they get into the profession, to meet some of the leading men in the profession, hear about their work and activities, and through as much contact with the profession as it is possible to give in that way, to gain some basis of judgment as to whether that is the line in which they want to go, the line in which they will probably be successful.

In the process of education, the engineering schools have been faced with two major problems, as I see it, both of them having to do with the increasing complexity of our educational program, as the techniques and the ramifications have increased in complexity. Originally, the engineering school had to provide a number of things that it doesn't have to provide at the present time. It had to train men in the techniques of the operations that they would carry out when they went into industrial organizations, because the industrial organizations were not as yet tuned up to the point at which they could train their own men in their own techniques. For that reason, the engineering schools had a combination of shop practice—training in the techniques—along with the training in the fundamentals and the specialties. But now, I think, every engineering educator agrees that the complexity of material to be covered in engineering has reached the point at which some sort of selection has to be made. It is no longer possible to train a man to be a skilful technician so he can go into an airplane factory or into an electrical shop and start in as if he were an experienced hand. For that reason, I think there is coming to be a greater and greater need for a demarcation between what we call the high grade trade school, which trains primarily in technique, and the engineering school, which is sacrificing some of that in order to establish the man firmly in his fundamentals.

The thing we are up against is perhaps best illustrated by the story of the lady who had a very profane parrot. Out of deference to the Sabbath Day, she put a hood on the cage every Sunday. One day, while looking out of her window, she saw the pastor of her church coming up the walk. Very much worried as to what might happen, she put the hood over the cage. Just as the pastor was being admitted at the front door, he heard a great squawk and commotion out in the dining-room, and these words: "I will say I think this is a hell of a short week." (Laughter.)

That is the thing we are up against in the engineering schools; four years is a hell of a short time in order to try to train a man to be an engineer. We have to make our selection in some way, and the tendency, I think, is very definitely in the engineering schools, as distinguished from the trade schools, to emphasize the fundamentals—physics, chemistry, mathematics, the fundamental engineering operations, and to postpone the training in the higher specialties for graduate work, except in so far as these specialties may be optional or elective courses in the upper years because of a particular interest of the students, because of particular desires that they may wish to follow. The tendency, in other words, is to train and not so much to feed in information; and various moves, of course, are being undertaken to make that possible—the introduction of honor courses, emphasis on the thesis, and things of that type.

I don't want to take very much time developing that, because I think you all know that situation as well or better than I do.

Coming to the third phase, the sales, we have a very interesting situation now in the placement of engineering students. The Society for the Promotion of Engineering Education made a survey a couple of years ago in regard to the placement of the last year's graduates from engineering schools, and found that, taking the country over, somewhere between 30 and 35 per cent. of the engineers had found jobs. That was at the bottom of the depression.

I think in all engineering schools the situation has changed for the better. Probably more than double that percentage of the last year's graduating class is placed. I think we are definitely faced, for some time at least to come, with the situation in which the competition for positions is going to be considerably keener than it was in the happy days before the depression, and that means that the training will have to be more careful, and better selection and so forth will be a much more important thing than it was before.

The characteristic of the placement, as I see it from the contact I have had with it in our institution, is the extraordinary care with which firms are viewing the new men that they may want to take on; they are writing the specifications with very great care. They don't want to get their organizations loaded up with material that they may be sorry for later on.

I have in mind what I think is the extreme case of this that I have happened to come in contact with. There is a large firm in this city that has been looking for four men; two in the research department, and two in the sales department as technical salesmen. They have been looking for these men for at least a year, intensively. I had an interview with the president of this firm, who told me he had been in touch with a number of other educational institutions. He wanted to get all the information he could about likely candidates, men between 30 and 40 years of age. He explained just exactly what kind of experience he wanted. About a month ago, or a little more, I heard from him that he had received from these various institutions, after careful culling by the placement bureaus of these institutions, nearly 1,000 men; that his organization had carefully culled over that last and had reduced it to 200; that he and his partner had interviewed 200 men, and out of these 200 men he had only found one that seemed to him to fill the bill, and that one he couldn't get.

That is an extreme case, but it very definitely illustrates the tendency of firms in taking on new men in their organizations at this time.

Last year, we had a conference with our Faculty Council, Alumni Council, and the placement officers of a number of large industrial organizations. These placement officers were the guests of honor and the speakers. We were interested in finding out what they would set forward as the qualifications which they were looking for in the men that they wanted at the present time. They put three or four things about on a par, and those three or four things to me were quite interesting: ability (of course taken for granted), co-operativeness, integrity and adaptability. And perhaps of all four of those things, the thing they emphasized most strongly was adaptability. They said, "Our whole organization is in a state of flux. What with one thing and another, we don't know where we are headed." There we have some of the elements in what we might call the personnel side of the flow sheet along from the raw material into the finished product, which is the practicing engineer.

I can't help mentioning in this connection a movement with which perhaps all of you are familiar, the movement that has been organized by what is known as the Engineers' Council for Professional Development, sponsored by seven of the national engineering societies, civil, mechanical, electrical, mining and metallurgical, chemical, Society for the Promotion of Engineering Education, and the National Council of State Boards of Engineering Examiners.

This Council for the Professional Development of the Engineer has in its own work adopted a flow sheet analogous to this one I have just mentioned, because the active work of that Council is being carried on by four committees, and those four committees take the engineer right from the beginning up somewhere toward the end.

The first one of these committees, headed by Dean Sackett, the Committee on Student Selection and Guidance, is making a study of some of these points that I have mentioned in connection with student selection, and actually has an active program under way in the testing of the effectiveness of some of these criteria for selection.

The next stage is represented by the Committee on the Engineering Schools, of which I happen to be the chairman, which has to do with the operation on these students in the engineering schools.

Then, the third committee, the Committee on Professional Development and Training, which studies the progress of the young engineer after the time when he is graduated from college, while he is still in his apprenticeship. This committee has made some interesting studies to find out just what the young engineers are actually doing when they are in this stage. For example, this committee sent out a large number of questionnaires to young engineers in this locality to try to find out whether they had definite objectives, whether they had laid out for themselves any definite program of study or development; what they were doing in their spare time; what they were reading, and so forth.

As I recall the results of that questionnaire, they were somewhat disappointing, as indicating a surprisingly large number of these men that had no definite objective, no definite program that they had mapped out. General Rees' Committee is undertaking to assist the men in this category.

Then, there is the Committee on Professional Recognition, under the chairmanship of Mr. Lauer, which has to do with various insignia, you might say, which indicate the arrival of the engineer at certain stages that are deserving of recognition, such as professional degrees, and things of that type.

I might say just a word with regard to the part of it that I am familiar with, and I can speak of this work of the Engineers' Council for Professional Development as an outsider, since I am not a member of the Council. The work of the Committee on the Engineering Schools is very large in its possible scope, but thus far it has been limited, for practical reasons, to just one activity, and that is, the study of engineering schools for the purpose of preparing a list of accredited engineering schools. Since the President of the National Council of State Boards of Engineering Examiners is over here at my right, I speak with some trepidation; but the point is, as you probably all know, that there has been a rapid move among the States to adopt compulsory licensing laws, starting, I think, about 1920 or perhaps 1922. The number has now grown until the last report that I have seen shows that there are 35 States in the Union that have compulsory licensing laws. This licensing is in the satisfactory hands of the State Licensing Boards. A very common procedure there is to have as the ordinary course of an engineer as he proceeds towards licensing, first, graduation from an accredited engineering school, then four years of practice—what might be called an apprentice stage—and eligibility after that to take the licensing examination.

If that policy is carried out, it requires the establishment of certain lists of accredited engineering schools. It is quite obvious, I think, that if such a list has to be prepared, it is important that it be prepared as satisfactorily as possible, because of the fact that it will have a profound influence on the progress of engineering education. If, for example, the criteria for accrediting were placed on a very narrow basis, as requiring so many hours throughout a year for so many years; so many hours devoted to mathematics, so many devoted to physics—which would be a very easy thing to do—it would crystallize engineering education right at that point, and it would be practically impossible to make any changes.

With the approval of the groups in these State Boards, an attempt is being made, under the auspices of these seven national societies, to set up a list of accredited schools which will be on a basis as satisfactory as possible to these groups which you see represented, the practicing engineers, the professional educators, and the engineering examiners of the States themselves.

That process is now rather actively under way in the New England region, and in the Middle Atlantic region. As soon as the way is cleared to proceed, as soon as authority is given, the machinery is all set up for continuing that throughout the rest of the country which, for convenience, has been divided into seven regions. In each of these seven regions, there are seven delegates and seven alternates, representative in each case of these seven societies. So, there is quite a group of carefully-selected men involved in carrying out this program, which will involve altogether 155 degree-granting engineering schools throughout the country.

There is another aspect to this question of the flow sheet from education to industrial research that has to do not so much with the man who starts in as a student and goes through into the profession, but has to do with the actual work of the engineer: consulting and research work; and I thought it might be of some interest to you if I spoke of this from the standpoint of the consulting and research work in an engineering school, because that has a close relation, in many ways, to the interests of this body.

The staff of an engineering school will be very ineffective unless it has a certain amount of contact with the live problems and activities of the profession. For that reason, our engineering education will certainly be very ineffective unless the staff have opportunities to participate in the work of the profession as consultants, or in the undertaking of industrial research. The professional advantages to the professor, of course, are obvious in his contacts and so forth. Also, we believe this contact is an absolute necessity for the educational program, in order that the program through which the students go will be a dynamic program; that they will see the engineering profession as it really is, a profession which is advancing by meeting new sets of problems, taking advantage of new discoveries, new techniques, and not simply a static thing which has been set down in a text-book and is learned once and for all.

Anyone who looks back a little bit in the history of engineering, ten years, twenty years, thirty years, can't help but be very greatly impressed with the dynamic quality of engineering, of the content of engineering; and it is very important, I believe, that the students who are being trained as engineers should get that concept of engineering as they are going through.

In connection with the research work or consulting contacts which members of the staff may make from time to time, there is the opportunity to bring into the institution live problems from industry which enable the more advanced students to get in a certain amount of apprentice training, so that they get the real feel of engineering before they get out into it. Of course, our whole concept of training in an institution is to bring the student to a point so that there is little discontinuity at the time of graduation, so that he passes as easily as possible from his advanced undergraduate days into the kind of work that he will be doing in the profession.

The advantages to industry in the work that can be done in educational institutions are several. Of course, anything that improves the quality of the training of the students is of immediate value to industry, because the next generation of industry is going to depend in large part on those students. Then, in educational institutions, there are certain types of work that can be undertaken to particular advantage there, and there are certain other types of work that cannot be undertaken to particular advantage. The kinds of things that can be done to particular advantage are things that either are along the line of a distinct specialty of a member of the staff, or problems that involve a degree of co-operative attack by men in different lines of specialties which is difficult to find in a small organization, or which require perhaps some rather unusual facilities. I will give some illustrations in a moment.

The opportunity for co-operation on the part of the staff of an educational institution from the standpoint, we will say, of chemistry, physics, engineering, mathematics, and so forth, is a remarkable opportunity, and there are certain types of problems that certainly lend themselves to handling in that way. You have probably all heard the story, which I think illustrates co-operation better than any story I have heard, of Sam, Sadie and Dan—I think I told it once before in New York. There was a poetry contest in school, and Sam, Sadie and Dan were the contestants. Sam was called on first. He got up and recited the following poem:

"My name is Sam,
When I grow up to be man
I want to go to Japan
If I can, and I think I can."

When Sadie's turn came, she said:

"My name is Sadie,
When I grow up to be a lady,
I want to have a baby
If I can, and I think I can."

Then Dan was called on, and he recited the following:

"My name is Dan,
When I grow up to be man
I don't want to go to Japan, like Sam,
I want to help Sadie with her plan
If I can, and I think I can." (Laughter.)

In an organization of this sort, there come to mind certain conditions which should apply to the consulting or research work done in an educational institution from the standpoint of, we will say, the ethics of the profession. One thing is this: Any fees charged should be on a par with the fees that are charged in commercial consulting organizations, so that there is no competition on an unfair fee basis. From the standpoint of the institution, I think it is quite important that the work which is undertaken should be of a character which will improve the man who undertakes it professionally—improve the staff member. That pretty largely rules out jobs such as testing; routine and chemical tests should be ruled out from an educational institution. They do not add anything to the life or content of the institution. They do not advance the professor in his profession. They can be done in any consulting chemical laboratory.

Then, of course, there is the question of the proper relationship of the man's activities to his other jobs of teaching and administration and the institution.

Finally, to take this matter up from the standpoint of specific illustrations as to how this consulting work is organized in educational institutions, and how, from this work in the educational institutions, there may flow into industrial organizations activities that are taken up there, I should like to mention two or three illustrations. Of course, a number of institutions have their consulting work on an organized basis; the Mellon Institute is an outstanding example; the University of Michigan and Purdue University, and some others, have other plans of some sort of division of engineering research where work is undertaken on contract and under definite conditions.

We have in our institution what we call our Division of Industrial Co-operation, which acts as a sort of clearing house for work of that sort. I will give five brief illustrations of rather different types of work. We are called on to do a good deal of work for government organizations, for the City of Boston, for Cambridge, for the State, and once in a while for the Federal Government. There we have a problem perhaps involving competition with private consulting agencies. I recognize that is true. On the other hand, from our standpoint, we are a public institution chartered under the State and tax exempt by the community, and we have to think twice if we do not co-operate with the Mayor of the City of Cambridge if he asks us to help him out with something. But, very frequently, there are types of work which come up that are of a rather unusual character.

Two or three years ago, there was a great deal of anxiety in the Back Bay region of the City of Boston because of the failure of the piling on which that whole section of the City of Boston is built. It became very acute under the Public Library, where it was found that some of the wooden piles had rotted entirely through. If that had gone on very much longer, there would have been a great catastrophe and an enormous expense. The problem was to find out what was the cause and how to cure it. The water level had dropped since the time the piles had been put in, and they were now several feet above water level and rapidly rotting. What had caused the water level to fall? A number of engineering firms in and around Boston had made observations, had driven test wells, had measured the water level over a period of years, but none of them had the complete information.

The Mayor of Boston asked our institution to see whether we could not get the various engineering firms and city engineering departments of the city together to pool all their information and conduct a common examination for the welfare of the city. That we succeeded in doing. When all the information was gotten together, it was found that there was a gradiant in the dropping water level from both sides towards a region around Boylston Street, which might have been due to a subway, or it might have been due to a drainage sewer that had been put in some years before.

To make a long story short, what had happened was probably that the earthquake we had in '27 or '28 had caused breaks in the sewer, through which the region was drained. Once this drainage was stopped, the water level rose to normal and has remained there ever since, thus arresting the deterioration of the piles.

Another type of investigation is one which is now under way on stainless steel. There is an organization which holds patents on stainless steel, and this organization licenses practically all the steel companies of the country. The stainless steel business is growing, as you know, very rapidly; it has increased five-fold since 1930. However, in spite of the fine qualities of stainless steel as regards its stainlessness and its remarkable strength, it is capable of greatly extended use if certain tendencies to corrosion and mechanical failure under particular conditions can be overcome.

The steel companies have been wrestling with this problem for some time. A number of suggestions had been made, but no solution has been found. The entire industry got together and co-operated in a program which they have centered up at our institution. We set up a committee of a physicist, a mechanical engineer, who has had a good deal of experience in fatigue failures and failures due to surface conditions, a metallurgist, who was trained as a chemist, and a physicist, who was trained as a metallurgist.

QUESTION: Are all these gentlemen members of your Faculty?

MR. COMPTON: They are. This committee started out by visiting all of the steel plants and their research laboratories and many of the largest users of stainless steel in the country, getting their experience and learning the conditions under which the steel was made and used. They employed four metallurgists and chemists, and several assistants.

Without going into the matter in detail, because the time is too short, I will simply say this: Electron diffraction and magnetic studies have suggested an approach to the solution of the problem which thus far looks distinctly promising. The co-operating companies are being kept informed of the progress of the work. If this should prove successful, or even partially successful, it will justify the expense and effort involved many times over.

The problem isn't as yet solved, but the situation is very encouraging. That was only one of a great variety of things that we are handling, but it illustrates what can be done in handling a very obscure type of problem by getting together a group of people who can co-operatively attack the problem from various viewpoints, with special emphasis on modern physics and chemistry.

A third type of problem, which is in a somewhat different category, is the development of apparatus for mechanical analysis. That started out with the interest of one of the large electrical companies in devising a machine which would enable the public utility companies to make easy computations of distribution systems by building a flexible model network which could be used for electrical distribution systems. On that instrument, problems of public utility companies are taken in and handled at cost plus overhead.

At the same time, one of the other large electrical companies wished to build a similar machine for the use of its own clients. We co-operated with them in giving them complete information as to our experience on that machine.

In connection with these electrical problems, it was found desirable to get a better mathematical solution of some of the problems of the distribution in a network, and particularly what happens in a network when there are short circuits, and when the load conditions are suddenly changed. In order to solve these problems, one of my colleagues invented a mechanical device for solving the differential equations involved. This instrument has been remarkably successful, not only for that purpose, but for a number of other purposes as well. It has found very important uses in astronomical observatories. There are two being built in Great Britain, one in Norway, and four others in this country are either built or in process of construction. There is a regular waiting list of men from our institution, and other institutions, and industrial laboratories, waiting for an opportunity to bring some of their mathematical problems to this machine for solution.

Then, another machine for the solving of integral equations and determining correlation coefficients between any two sets of data is a very interesting thing. Still another is a machine for solving simultaneous linear algebraic equations. In the analysis of the stresses in an airplane wing, if the analysis were to be done accurately, I am told that a solution of 52 simultaneous algebraic equations is involved. By means of this machine, those solutions can be obtained with sufficient accuracy for engineering purposes by a single setting of the machine.

Those are some out of eight different types of machines that have been developed at M. I. T. for performing some of the mathematical operations of engineering, and of course this is a type of development that is available to the engineering profession generally, if it wishes to use it.

A final illustration has to do with our study of the physical characteristics of fog, which was undertaken as a scientific study to find the size of fog droplets and the penetrability through fog of light or radiation of different wave lengths running from the ultra violet clear out into the short wave radio regions of the radiation spectrum. As a result, there has come a practical method for dissipating fog over a restricted area. The method, as you may have seen it described, is something of this sort: There is a horizontal pipe stretched, say 50 feet above the ground and 100 feet long. The pipe is provided with a lot of nozzles producing a curtain of spray. The spray is of a saturated solution of calcium chloride which is pumped in by pump fans. The wind is blowing the fog in perpendicularly past the pipe. In a fog, about 95 per cent. of the moisture is usually in the vapor state and only five per cent. in the form of drops. The falling spray dries the passing air, and the fog droplets quickly evaporate. This dried air is carried on to form a clear space 50 feet high, 100 feet wide and about half a mile long. We don't know how much farther this clear space would extend, because a distance of more than half a mile carries the air to a hill and woods.

This is of considerable interest to the Navy Department, the War Department and the Commerce Department because of its possible application to landing fields. The modern methods of steering airships by radio are easily accurate enough to steer an airship into a region which is 100 feet wide and 50 feet deep—at least they tell us there is no difficulty with that at all. Consequently, a combination of that radio method with this clearance space would enable the pilot to see the ground clearly just before he lands.

One of the offshoots of that investigation was rather interesting. After we carried it up to the point of the first test, our funds ran out, and we have been financed during the last two years by appropriations from the Navy Department acting for Navy, Commerce and War. The objection they at first had to it was the fact that calcium chloride is so terrifically corrosive that they weren't willing to risk exposing the airplanes to the small amount of the very fine spray that might be carried along. However, I believe, following a lead that had been developed by the refrigeration engineers, it was found that putting two hundredths of one per cent. of sodium chromate in the solution makes it non-corrosive, and that has completely eliminated this difficulty.

Around the Middle West, there was a time when calcium chloride was used in very large quantities as a means of laying the dust on sand and dirt roads, but it was discontinued on account of its action on fenders of automobiles. It now appears possible, I think, with this new finding, that it may again be used on dirt roads if mixed with a little sodium chromate.

That is an illustration of a way in which an investigation, started purely as a scientific research investigation, may lead to several offshoots that have commercial or industrial importance. That group is typical of by far the largest group of investigations of one sort or another that our engineering schools undertake.

We have to be very much on guard in an educational institution in undertaking consulting work for organizations because of the dangers of improper advertising. The director of our Division of Co-operation estimates that 90 per cent. of the firms that have come to us were really not interested in the job, but interested only in the ability to say, "M. I. T. has made certain tests." They want to use it for advertising purposes. We try to protect ourselves and the public as well as we can by always insisting in the contract that the name of the institution shall not be used in any way in advertising. We do not always succeed in having that contract held to, but we do as well as we can.

Those are some of the things that we run up against, and in a very sketchy way some of the types of problems that we undertake in this general field that we call our field of industrial co-operation.

So, in conclusion, I will, just by way of summarizing, say again that in this flow sheet from education to industry we think of the two things: we think of the flow of men from boyhood into the engineering profession, and we think of the flow of scientific developments that may originate in the educational laboratory, and may develop to a stage where they are of sufficient value to be taken up in industrial organizations and perhaps come to organizations like yours to be put in proper shape for industry.

The value of discussing things of this sort, problems of an educational institution before a body of consulting engineers, is perhaps suggested by the story of the rooster. One time a rooster rolled an ostrich egg very laboriously to the henhouse to the admiring view of the hens who were watching from above. When he got the ostrich egg up, one of the hens asked him what he had brought it up for. He said, "Girls, I wanted you to see what they were doing in other places." (Laughter.)

I hope that in this problem in which we have all a mutual interest, the problem of educating young engineers to come into the profession, we can always have, as we have had in the past, the support of the men who are now actively in the profession, but who must look with some concern to see that the profession is carried on worthily by their successors. (The members arose and applauded.)

President Burpee: President Compton, as we have listened to your story of amazing—nothing short of amazing—achievements in research and chemistry, we are sure that the training of the youngsters is safe in your hands. While I wish to avoid anything that sounds like a facetious remark, you may be assured for yourself and your colleagues that no member of this body will ever attempt to compete with your mechanical machines in the solution of differential equations or problems.

Now, gentlemen, I think Mr. Lavis was very kind, in reading his report, to omit certain remarks about American Engineering Council. Some of the replies put the Council somewhat on the defensive for having failed to provide a job for every engineer in the United States. I stated before that we have the Past President, the present President, and the boss of them both, the Executive Secretary, here. Mr. Feiker will now tell you what American Engineering Council is doing for the good of the profession. Mr. Feiker! (Applause.)

MR. FEIKER: Mr. President and Gentlemen: The only reason I suppose I am here is because I told a story last year that had to do with what presidents are and what secretaries are. I feel a bit submerged at the moment in the hands of not only the President and the Past President of American Engineering Council, but many other members of the organization. So far as American Engineering Council is concerned, I suppose it is fair to say that you should go to these gentlemen rather than myself to find out all the things that perhaps we can do, should do and must do.

I was very much interested in Dr. Compton's picture of technical development, particularly interested because it seems to me that if at the end of another fifty years we are here together, we may know something about this relation of engineers to non-technical problems, and their collective action with regard to them, because it seems to me, looking at the thing from that broad point of view, that engineers have spent most of their time during the past fifty years dealing with the technical, working with the technical, and not dealing collectively with the human and the public problems. We need a literature and a technique in approaching that as definitely as we have a literature and a technique of the other.

We hear all sorts of stories these days. I tell stories about my family usually, because I discover that most people haven't heard them before. One of my boys came in the other day, just before Christmas, and wanted to know why Mae West and Santa

Claus couldn't get into a 'phone booth together. As a father, I was a little serious about that story. I thought of everything I shouldn't have. After I had given it up he said, "There ain't no Santa Claus." (Laughter.)

When I discuss the place and purpose of American Engineering Council in an audience as sedate as this this evening, and I explain American Engineering Council as a service organization functioning for its member organizations on those problems which they give to American Engineering Council, I am reminded of a story Will Rogers is said to have told at a meeting of the Standard Oil Company in discussing service. There was a big sign on the door about the service of the Standard Oil Company. He said he had been looking at the sign all evening, and he was reminded of an adventure in his boyhood days when his father was on a farm. They had a bull enclosed in a high board fence. The cows would disappear behind the enclosure and come out satisfied cows. Will was very much interested in what went on in there. He said to his father, "Father, what is going on in there? I don't understand it."

The father said, "That is just service, son. I am just giving service."

Will said he thought one day he would find out what was going on. He knocked a knothole in the fence, and then he discovered what the Standard Oil Company was doing with its customers. (Laughter.)

I hope when you look through the knothole in the fence of American Engineering Council, you haven't that conception of service.

I suppose that our broad function is to share the common purposes of engineers as they are served by the Council, and to speak very briefly because the time is late, I will tie it up as quickly as I can into three bundles.

We have the function of acting in the public interest, that of an unprejudiced body of men interesting themselves in those questions that concern the development of our country from a public point of view, and trying to express as engineers our conception and our ideas with regard to their value. If you had attended our Annual Meeting, I believe you would have had a fresh conception of what that service is if you could have heard any of our reports on public affairs, some seven or eight of them.

A second broad group of functions have to do with promoting the high professional standards and values. We undertook this last year with the Bureau of Labor Statistics a survey of the engineering profession. It was reported in a most interesting way by Dr. Lubin, the Commissioner of Labor Statistics. For the first time in this country, an analysis will be made of the education of some 60,000 engineers, as they expressed it in terms of that number of questionnaires, their compensation over a term of years, their present occupation, and distribution and industry, and the interrelation of all these three factors, one with the other. I suspect that that volume will become, when those facts are put on paper, the basis for very many discussions as to the trends in engineering education. As to the opportunities for engineers in public service, as to the interrelation between engineers in public and private practice, about which we talk a lot, and about which we have few facts—this will give us a great many basic facts. That undertaking has been in the works nearly a year. I believe within the next three or four months we will have a basis for a discussion of many of these topics, some of which have been touched on already by Dr. Compton, and many of which have to do especially with public relations of engineers, both in the fields of their service to the public and in private; the question of compensation and fees, all of which are brought out in this report.

There was an interesting discussion of the merit system. One of the things that is a great problem in federal, state and local government is not only the developing number of engineers in their relationships, but the developing breakdown of what we have always thought of the merit system as a basis of technical employment. When I tell you that we discovered that the SEC was trying to find a man for $1.50 a day to do some work for them, and we asked them what they really expected to get for $1.50, they hadn't thought before that they were asking for a kind of service, patriotic service, without any idea what they were asking for in terms of compensation to the men, or the expectation of securing that knowledge and information on the basis of such a ridiculous sum of money.

The fees paid to engineers in government vary all the way from $1.50 a day, which is the lowest, to a good many dollars a day, depending on the particular department. There is no base. We believe there is an opportunity to set up some basis through the classification department in the Civil Service. We are working at that problem at the moment with the Civil Service.

We were addressed by Commissioner White of the Civil Service at our Annual Meeting, and, as many of you men who were there know, his own point of view is exactly that of the engineers with regard to some of these matters. We have only to work together on some of these common problems.

Then, we have the job of protecting and publicizing these public values so as to serve the profession. American Engineering Council, by its Constitution, is not a welfare organization, or an organization to advance the selfish needs of the profession. Those needs are advanced, as far as American Engineering Council is concerned, indirectly by setting up such relationships in this field of public service, that these values and these opportunities and the place of the engineer is made evident by publicizing the kind of things that engineers accomplish, and can do.

This publicizing of engineers and engineering has a protective function. Take the field of unfair legislation, which has been referred to already. We are working with the members of this organization and others on that problem. We have opposed, for example, the idea that only lawyers should appear before Commissions. That proposal, fortunately, died in committee this year. I don't believe it will get out of committee this year. The whole field of government compensation—if you read Mr. Hammond's report, you would find that it fits very closely into the kind of thinking expressed by Mr. Lavis in his discussion.

The other night, at the Annual Meeting of Council, Dr. Howe, our toastmaster, read a long three- or four-paragraph definition of an engineer. He then said the shortest definition he ever heard was that the engineer was a man who could blow a mouth organ under water. Between the long definition of what an engineer is, and that silly definition of what an engineer is, are all kinds of definitions. Sometimes I think the public concept of what an engineer is, is a man who drives a locomotive. We have all sorts of concepts of an engineer. We have to see if we can't make clear the purpose of the engineer, and his place.

One of the reasons for these misconceptions is the fact that the engineer, professionally, is not as clearly understood as the doctor or the lawyer, although there are just as many different types of doctors as there are engineers. If you heard Dr. Durand's talk and Mr. Flander's address the other night at the American Engineering Council, you would have heard two men try to express, and I think very well express, the place and purpose of the engineer in the development of our industrial life. The American Engineering Council, in offering a forum for that sort of subject, lends itself to the publicizing of the engineer in that sort of way.

We have been using the phrase, "Washington Embassy." My friend on the right said he didn't care to come to Washington any more because he hadn't had his tail coat pressed for a long time, and that he was a little fearful that he couldn't come in unless he had on a swallow-tail coat. In these days, the plug hat era of diplomacy has been given up for the no hat era. I think all the cranks in the world are concentrated in Washington. It is a curious fact that the town is full of young men without hats presenting new ideas and new policies and new plans. Yet, out of it all, American Engineering Council has to try to represent as many different points of view, and as many relationships, I suppose, as ever before.

I heard a story the other day of what a diplomat is that perhaps may be true. It was told by the President of New York University. The story goes something like this: that a young man and his dad had all their lives agreed they would be great pals, and that when the boy ever had a problem he would ask his dad all about it, and when the dad had a problem he would put it up to his son. In his sophomore year, the father got this letter: "Dear Dad: I am now facing the greatest problem ever put up to me. I have met the girl. She loves me very much. I don't know what to do. Should I leave college, marry the girl, get a job, or should I stay in college, finish my course, and take a chance on losing her? Let me know? Your affectionate son."

The father wrote back this letter to his son: "Dear Son: I am glad you remembered we had this contract. This problem that you have put up to me is probably the greatest one in your life. There is only one answer to it: If this girl is near as fine as your mother; if you love her the way I know you love your mother, there is just one thing for you to do, son, leave college. Your affectionate dad. P.S.—I wrote this letter with your mother looking over my shoulder. Don't be a damn fool." (Laughter.)

I have sometimes told my friends, after having spent now some six years in Washington, that I have only two things left after that period of service; one was a sense of humor, and the other was the ability to curse, and I am not sure which comes in the handiest.

I do believe that the Annual Meeting of Council we have just come from, out of the experience of which I speak to-night, emphasized to me two major ideas, and I am sure that these would be expressed by my President and my Past President who are here with me to-night. I got a sense of solidarity in the profession as expressed in speeches, not written by secretaries, but by some score of men, I should say, speaking on different occasions and different times during the two-day sessions we held in Washington. Over and over again these men said that this was the time when unity of the profession was a real objective, and they each and all shared in the belief that the time had come to approach some of these common problems in a spirit of unity.

The second idea, perhaps more intimately practical and certainly more intimately needing fulfilment, was that if we are to have unity of the profession, it must begin at home; we had to start from the bottom up. In that spirit, during the past year, American Engineering Council has initiated a development which, I think, will have great possibilities in uniting for common purpose some of these common objectives. Under the leadership of our Membership Committee, we established a type of membership which made it possible to enroll the local engineering organizations." When I tell you that there are some 81 national engineering societies in this country and some 450 sections and local engineering societies, you will see that this problem of engineering organization and co-ordination is not a simple one. There are also some 131 local engineering societies independent of local sections. During this last year, under our new plan, we have added some 22 new members to Council, so that we now have the largest number ever of members in Council.

We hope during this coming year to develop within our Public Relations Committee a group of public relations committees, locality by locality, as fast as we can organize them, and relate them to our national Public Affairs Committee, so that we will have both a sounding-board from and a sounding-board back to Council. We can take a report like Mr. Flanders', in which we attempt to start with the objectives of American life and lead down through, how to reach those objectives, both economic and social, and start discussions on those locally through our local organizations, and reflect back that educative opinion. In that way, at least, we will be doing our part as engineers toward establishing a basis of logic.

I don't know of anything that is unhappier to an engineer who attempts to be a diplomat in Washington, as I am, than to be faced with the fact that emotion and not logic controls most of the enterprises in our public affairs. You all know that without my telling you. You all know that the engineer, moreover, discounts emotion, naturally, from his training, and yet emotion and the intangibles may have to do more often with a final answer to a problem than the thoughtful fact-finding approach that we as engineers believe is sound and proper.

We have to do two things, as I see it, as it was expressed by another president of an organization—we have to decide that we have to study the weaknesses of men as well as the strength of materials; not to study the weaknesses of men in the political sense to seek their downfall, but to study the weaknesses of understanding of men. We must find ways to educate our nation to what we believe to be sound economics and sound engineering approaches to some of these national problems. It is only in that way, it seems to me, that we can go forward together with some of these larger problems.

It is easy, I say to you very frankly, to put on a sheet of paper that we can do all these things, but it is so much more difficult to get them done. I may get a telegram this week from an engineering organization saying in essence: "For God's sake, stop all this government spending," and in another telegram from the same organization, "For God's sake, get us some jobs for engineers." We have to take them to the same office in Washington. That is about as logical as we engineers are with regard to some of these problems that we put to each other. It can't be done that way, gentlemen.

On the other hand, I have felt very definitely that the trend at the moment in Washington, as far as the concept of some of these ideas are concerned, was more definitely in the direction of the kind of thinking that most engineers believe is sound. Engineers as a whole in government to-day are contributing their part as technical and the professional men on the technical details of the government activities.

We as engineers must find a way to express ourselves more definitely on national policy. We can't do this by setting up another organization, or saying that this or that be done; we have to find a deeper way, it seems to me; we have to find a way not only to begin now with the men who are at work, we have got to begin with the young men, have them understand that the problem of an engineer, part of the problem he finds when he gets out is adjusting himself and his ideas to those of other men, and that this problem that Dr. Compton has already referred to as one of adaptability, is the way of getting answers for some of our national problems.

We have been accused sometimes by those of the other professions, or we have been accused rather by those in our own profession of being less able to express ourselves collectively than the other professions. The architects, at a recent annual meeting, said they wanted an organization set-up in Washington like American Engineering Council. We took that as a compliment, because we have been told that the architects had already the best kind of organization for this in the United States.

I believe that that spirit of unity and that opportunity that we feel together for approaching some of these common problems will give us the opportunity to meet some of these objectives. I almost feel that I am making my report to a Board of Directors when I come here this way. I am sorry to have to speak, as I always do, rather intimately about the job that pays me money. I think my President should be doing the job and telling you how smart I am rather than myself. Last year I told a story about a president. I have a new president this year. I have got to tell a new story, because that one wouldn't be fair to the old president, and it wouldn't be fair to the new one, either.

I remember when I was a young man in Chicago, just starting in the publishing business, there was a firm of shoe manufacturers called O'Connor & Goldberg. They had a fire once. The reporters went to the office of the firm and they said, "Mr. O'Connor, what about that fire; how did it start," and so on?

Mr. O'Connor said, "Don't ask me about that; Goldberg looks after all our fires."

When anybody puts a problem up to me that I don't know the answer to, I shall say, "Don't ask me about that; that is Dean Potter's job." I suppose when Dean Potter has somebody put a tough one up to him he will say, "Don't ask me about that; that is Feiker's job."

If I have as much satisfaction and happiness, as I am sure I will, in working the next two years with my new President, Dean Potter, as with my Past President, Mr. Coleman, and with the secretaries of the Associations around the table, I think we will share an opportunity for some of the accomplishments that we all seek. We have had a grand year together. I do think we have made some progress. We have about three dollars left in the kitty. We hope we will have a little more left at the end of next year. We can't do this publicizing job you suggest is needed for the engineer for the $100 a year we get from the American Institute of Consulting Engineers.

Gentlemen, we hear a good many discussions at times about the high cost of belonging to engineering organizations. I learned the other day of a carpenter over in New Jersey who pays his normal dues to the union of ten dollars a month; then he pays five dollars a month, hoping that he will get a job, and if he expects to get a job, he pays five dollars in addition, to the walking delegate.

The American Federation of Labor is an organization which promotes labor in Washington. Its budget is stated in millions; American Engineering Council has about $30,000. Some of these objectives that we as engineers seek together to get done, we talk about; we think we will get them done, but they can't be done that way; they can't be done by me or anybody else alone; they can be done in a collective spirit, and they can be done by organized approach, but they can only be done by seeing the job as big as it is and collectively finding some answer to it and the money to do it.

I don't expect $1,000,000 this next year, and I am not asking for it. That is not my task. Fortunately, I have a grand Finance Committee. Some of these jobs which you seek to get done, and which I believe can be done, do call for both a point of view of vision and of purpose that perhaps we have seen only a little of and also for money. In the same spirit that some fifty years ago most of you gentlemen with gray hair around this table organized your professional societies, for the technical advancement of the profession, so we to-day are at the beginning of collective action with regard to our common public and economic problems. We have little literature. We have the beginnings of an organized approach.

We can get this job done if we tackle it in that spirit that you gentlemen tackled the technical problem fifty years ago.

Thank you very much. (Applause.

President Burpee: Mr. Feiker, there is too much truth in what you say, but I think in the year to come we will probably continue to raise hell with you just the same at the rate of $1 per capita. You might have gone further in one thing that you said, and that is this: Engineers, unfortunately, are too human, and we are guided in our decisions by emotion. All great decisions in history have been based on emotion and not fact. That is true of everybody.

I have an apology to make which causes me a great deal of chagrin. I was trying very carefully to introduce the representatives of every organization that we had present here. I find that Mr. Ferebee, at my right, is the President of the National Council of State Boards of Engineering Examiners. I apologize to him for having failed so to announce this at the beginning of these proceedings. We are glad to have him present.

We are proud and we are honored to have with us to-night the presidents of the two oldest engineering institutions in the United States. We have heard from President Compton, of the Massachusetts Institute of Technology, which was founded, I believe, in 1861. We have present with us to-night President Hotchkiss, the new President of Rensselaer Polytechnic Institute, which was founded in 1824, and which, I think, is the oldest engineering school in the United States. Is that true, President Hotchkiss?

Dr. Hotchkiss: Yes.

President Burpee: I think this evening would not be complete without a word from President Hotchkiss. (Applause.)

Dr. Hotchkiss: Your President has spoiled my evening for me by mentioning when we sat down that he was going to call on me for a few remarks. I have been puzzled ever since as to how to address this crowd. I have got to ask for information. I know that I should say fellow president, and fellow past presidents, and secretaries, and fellow guests. Are there any others here? (Laughter.)

President Burpee: President Hotchkiss, there are a few unadorned members.

Dr. Hotchkiss: And members of the Institute—I will add that to be correct. I shall endeavor to make my remarks very brief, gentlemen.

I have had another wonder as I sat here, as to why they put me on this side of the President, and President Compton on the other. Of course, his is the largest engineering school, and mine is the oldest, and I was going to say the best, but after President Compton's story about the rooster and the ostrich egg, I don't care to.

After listening to these addresses to-night and reports and so forth of the multitudinous and multifarious activities and interests of engineers, I am reminded of a story which happened out at one of the resident hotels in Columbia. There was an English lady there doing some special work. At this little hotel, there was a negro factotum who waited upon tables as one of his duties. This English lady had a very good appetite. She would order a steak and potatoes and beans and other things that made up a very extensive meal, and George, in his wisdom, would bring in a salad. She stood it for several days. Finally she said, "George, you are going to starve me to death. I didn't order this; I ordered a real meal."

George replied, "I have got to look after you. You are sitting on too much already." (Laughter.)

I think in spite of all this puzzlement, and all this difficulty which we as engineers are in, we can consider ourselves as one of the most important coming professions. As I look over engineering education, in which I have been for the last ten years (before that I worked for a living), there seems to me to be one thing which makes engineering education an outstanding type of education, which is the coming type for the needs of the young men of our country.

I have sat in with groups of economists, and I may say, to compliment you gentlemen here, that they didn't look half as intelligent—I know if the "Brain Trust" had been made up of men selected from this room, we wouldn't be in near the trouble we are to-day. But if you think of the so-called cultural type of education, and I say so-called very deliberately, because I think there is just as much culture in an engineering education, properly given, as there is in any other type—that type of education is qualitative. No economist can value his factors as you have to as engineers. He can't select major factors and minor factors and say, "This factor has twice the weight of that; and here is a group of second and third order minor factors." No historian can value his knowledge in any such fashion as that. No other type of education, except engineering and the natural sciences, is of the sort that is needed for the guidance of our affairs in these days, and the days that are to come.

Engineering education, by contrast to the qualitative nature of letters and arts education, is quantitative in character. When you get through analyzing a thing, you can put Q. E. D. after it, and you can't with the problems that the psychologist, the historian, or the others study. So, I think that we of the engineering profession can look forward to an increasing public appreciation of the type of leadership which we offer, which is going to be the type of leadership that is going to lead our present situation out of the woods and keep it on a quantitative basis, a study of the factors in a way in which you can say Q. E. D. after you have analyzed it. So, I think we as engineers can look forward, as no other profession, to a continued and rapid increase in the importance of our profession.

I am glad to be here. I am glad to meet some of you old friends whom I haven't seen for a long time, and had almost forgotten. I met Mr. Diehl last in 1908, and Danny Mead over here when I helped initiate him into Tau Beta Pi. I am glad to be here to meet old friends. Thank you. (Applause.)

PRESIDENT BURPEE: I should have said that before President Hotchkiss went to Rensselaer in 1935, he was the President of the Michigan School of Mining and Technology, and prior to that he was with the University of Wisconsin. He is not only an engineer but an accomplished geologist, and one of the country's authorities on geology.

The hour is so late that I don't intend to ask for any more talks. I am sorry that we can't hear from Dean Potter. I am also sorry that we can't hear from Professor Beggs, of Princeton, on this subject of engineering education.

As it is almost midnight, I think the sensible thing to do is to decide that we are near adjournment, and to show our respect for these guests and speakers who have come from some distance to be with us to-night, and have contributed so much to our understanding of what the schools are doing, and what American Engineering Council is doing, by a rising vote of thanks.

The members arose and applauded.

PRESIDENT BURPEE: This meeting is adjourned *sine die.*

(The meeting adjourned at eleven-fifty o'clock.)